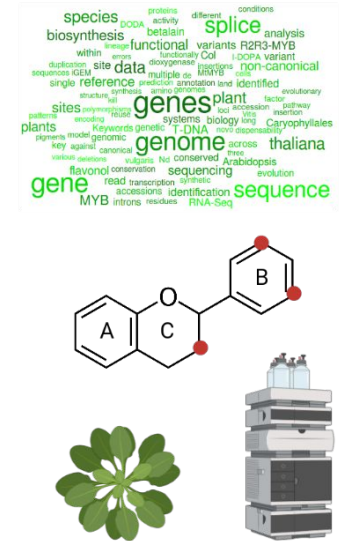
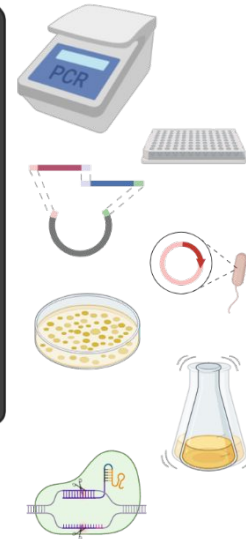
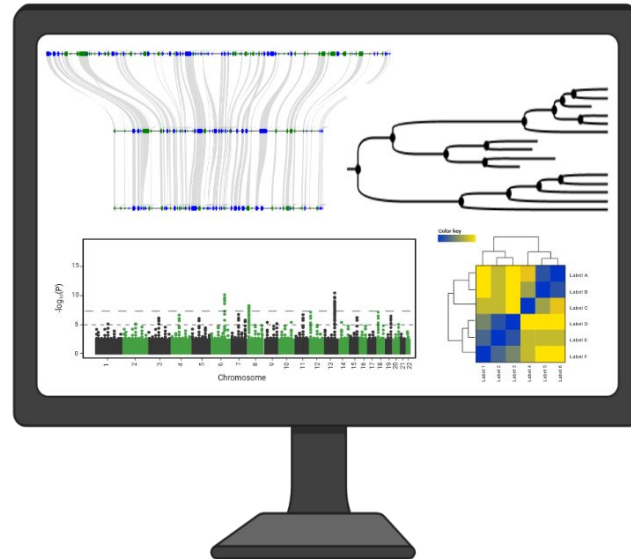
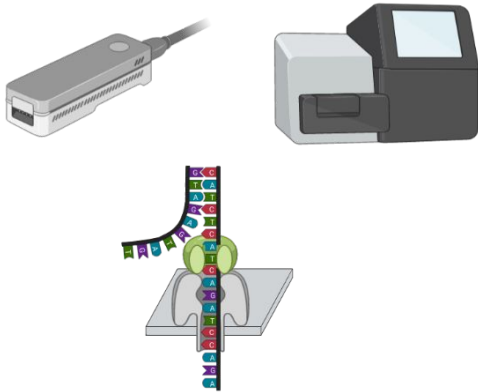




Technische
Universität
Braunschweig



Plant Biotechnology
and Bioinformatics

Python - Artificial Intelligence

Prof. Dr. Boas Pucker (Plant Biotechnology and Bioinformatics)

Availability of slides

















































- All materials are freely available (CC BY) - after the lectures:
 - StudIP: 'Python for Life Scientists'
 - GitHub: <https://github.com/bpucker/teaching>
- Questions: Feel free to ask at any time
- Feedback, comments, or questions: [b.pucker\[a\]tu-bs.de](mailto:b.pucker[a]tu-bs.de)

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Introduction to Artificial Intelligence (AI)

- “simulation of human intelligence processes by machines, especially computer systems”
- Examples: Google searches, Netflix recommendations, self driving cars, ChatGPT3
- AI envisioned in 1956, but only took off after 2017
- LLM = Large Language Models

AI options

THE ULTIMATE AI TOOL CHEAT SHEET			
LLM / TEXT	IMAGES	VIDEOS	AUDIO
 ChatGPT	 Midjourney	 Runway	 Murf
 Claude	 DALL-E 3	 Pictory	 Eleven Labs
 Bing Chat	 Leonardo	 Veed	 Otter
 Google Bard	 Firefly	 HeyGen	 Speechify
CHATBOT	MARKETING	PRESENTATIONS	DESIGN
 Dante AI	 AdCreative	 Tome	 Canva
 Air	 Claude	 Simplified	 Adobe Firefly
 ChatSimple	 Jasper	 Beautiful.ai	 Designs.ai
 Zapier	 SEMrush	 Synthesia	 Mokker
SOCIAL MEDIA	RESEARCH	COPYWRITING	PRODUCTIVITY
 Sprout Social	 HARPA	 Copy.ai	 ChatGPT Plus
 Emplifi	 Perplexity	 Grammarly	 Taskade
 Lately	 Glasp	 Wordtune	 Audio Pen
 Brandwatch	 ChatGPT Plus	 WriteSonic	 Notion AI

<https://www.instagram.com/p/C067XZ5PKde/>

Introduction to AI-Generated Code

- Definition: AI-powered tools and techniques for code generation.
- Significance: Transforming software development, automating repetitive tasks, enhancing productivity.
- Impact: Revolutionizing coding practices, enabling new possibilities in software engineering.

AI for Code Translation and Refactoring

- **Translation Between Script/Programming Languages:**
 - Applications: Porting projects, integrating libraries, interoperability.
- **Refactoring Tools:**
 - Features: suggesting improvements, optimizing performance.
 - Challenges: Maintaining functionality, preserving code quality, handling edge cases.

Code Generation with Generative Models

- **Generative Models:**
 - Definition: Models capable of generating new data samples.
 - Applications: Generating code snippets, functions, scripts.
- **Considerations:**
 - Ethical Implications: Ensuring code quality, security vulnerabilities.
 - Practical Challenges: Handling code complexity, maintaining readability.

Ethical and Practical Considerations

- **Risks & Limitations:**

- Quality Assurance: Importance of human oversight, code reviews.
- Security Concerns: Identifying and mitigating vulnerabilities, ensuring data privacy.

- **Best Practices:**

- Responsible Use: Understanding AI limitations, continuous monitoring.
- Collaboration: Balancing AI automation with human expertise, fostering teamwork.

ChatGPT3.5

8

You

How to generate a plot in python that visualizes a list of values?



ChatGPT

To generate a plot in Python that visualizes a list of values, the most commonly used library is `matplotlib`. Here's a step-by-step guide on how to do it:

1. Install Matplotlib (if you haven't already):

```
bash
```

Copy code

```
pip install matplotlib
```

2. Generate a Simple Plot:

Here's a basic example to plot a list of values.

```
python
```

Copy code

```
import matplotlib.pyplot as plt

# Sample data
values = [1, 2, 3, 4, 5]

# Create a plot
plt.plot(values)

# Show the plot
plt.show()
```

3. Customize the Plot:

You can customize various aspects of the plot like adding titles, labels, changing colors, line styles, etc.

```
python
```

Copy code

```
import matplotlib.pyplot as plt

# Sample data
values = [1, 2, 3, 4, 5]
labels = ['A', 'B', 'C', 'D', 'E']

# Create a plot
plt.plot(labels, values, marker='o', linestyle='--', color='g', label=

# Add titles and labels
plt.title('Sample Plot')
plt.xlabel('Categories')
plt.ylabel('Values')

# Show legend
plt.legend()

# Show the plot
plt.show()
```

TU AI toolbox

- Usage of different ChatGPT versions through TU interface
- Ensure data protection
- Several restrictions (usage policy)
- Details:
<https://magazin.tu-braunschweig.de/en/m-post/data-protection-compliant-working-and-studying-with-ai/>

6. May 2024 | Magazine: Campus Life

Data protection-compliant working and studying with AI

Easier access to AI technologies for students and employees with AI Toolbox

Since the beginning of May, Technische Universität Braunschweig has been offering all employees and students an internal web portal called "AI Toolbox" to support the broad use of artificial intelligence (AI) centrally and in compliance with data protection regulations. The AI Toolbox is available free of charge to all employees and students with their user ID and can be accessed from TU Braunschweig's network and externally via VPN.

Anonymous use

The main advantage of TU access is that it is anonymous and therefore data protection-compliant, and does not require individual registration with the commercial services behind it. The AI Toolbox currently provides access to three main AI services: ChatGPT, DallE and DeepL. ChatGPT is a text-based dialogue system. The chatbot is designed to engage in interactive conversations and solve more complex tasks. DallE generates images based on text instructions. DeepL completes the offering with a powerful AI-based translation engine that can currently translate between 23 languages.

Accompanying critical discussion

The aim of introducing this AI Toolbox is to facilitate access to AI technologies for TU members and to expand the areas of application of AI for all TU performance dimensions, research, teaching and studies, transfer as well as governance and administration. The use of AI applications is also being widely and critically discussed at TU Braunschweig, as the use of AI, like all tools, brings with it not only opportunities but also risks.

Always checking truthfulness

In practice, there are challenges for users that need to be carefully addressed depending on the context of use. For example, the truthfulness of outputs generated by predominantly statistical AI processes must always be checked by the users themselves. There is generally no claim to accuracy. In principle, AI tools are trained with data, the quantity and quality of which has a significant impact on the quality of the results generated by the tools. In addition, the user's input data is almost always used by the provider for further training of the tools, which makes it essential for the user to respect personal rights and copyrights.

Training offer

In order to support staff in using the new AI Toolbox, the Ki4ALL project, together with the Central Staff Development, is offering two training formats: In the online introductory course "Die neue KI Toolbox – Was ist es, wie funktioniert es und was kann ich damit machen?" (The new AI Toolbox – what is it, how does it work and what can I do with it?) on 27 May 2024 and 11 June 2024, you will receive basic information about the toolbox and have the opportunity to try it out in practice and ask questions.

The advanced classroom event "Bilder erzeugen mit der KI-Toolbox" (Generating images with the AI Toolbox) on 18 June 2024 will teach you how to use the image generator in your work.

For a quick overview, the [training documents for self-study](#) are available for safe and responsible use of AI.

*This article was created with the support of AI tools.

ChatGPT limitations

- V3 refuses to report scientific publications (used to make them up)
 - V4 is able to provide accurate references
- V3 refuses to report sequences
- Quality depends on input data and knowledge is outdated
- ChatGPT3.5 performs above average human performance in many cases
- ChatGPT4 was trained on AI generated code; potentially lower performance in some cases

Bing Chat

- Provides summary of search results
- Requires Microsoft Edge as web browser

Exercises

- Repeat the exercises of all previous parts with AI support
- Take notes about interesting observations
- Is the AI solution better than your own solution?
- What are the advantages of using an AI?
- Are there disadvantages of the AI solution?

Time for questions!